



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,467	03/15/2004	Robert A. Hasenbein	09991-123001	3190

26161 7590 02/22/2007
FISH & RICHARDSON PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

GARCIA JR, RENE

ART UNIT	PAPER NUMBER
----------	--------------

2853

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/800,467	HASENBEIN ET AL.	
	Examiner	Art Unit	
	Rene Garcia, Jr.	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-28, 32 and 33 is/are rejected.
- 7) ☒ Claim(s) 16, 29-31 and 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Objections

2. Claims 25-27 are objected to because of the following informalities: the term "mass" has been used to describe desired limitation of a droplet, however mass is typically quantified in terms of grams not pico liters as set forth in claims. Pico liter is a volume quantifier and either mass is to be disclosed or a volume but appropriate quantifier is required. For purpose of examination a volume is used to reject claims. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-10, 12, 13, 14, 17, 28, 32 & 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi (US 6,099,103).

Takahashi discloses the following claim limitations:

*regarding claims 1, 28 & 32, method for driving a droplet ejection device/**ink jet printer**/ having an actuator, comprising: (fig. 8A,8B; col. 1, line 34- col. 2, line 31; col. 6, lines 58-63)

Art Unit: 2853

*applying a multipulse waveform (fig. 1) comprising two or more drive pulses (col. 7, lines 7-26) to the actuator to cause the droplet ejection device to eject a single droplet of a fluid

*wherein a frequency of the drive pulses is greater than a natural frequency, f_j , of the droplet ejection device (fig. 1; col. 2, lines 10-15; col. 7, lines 27-44: $T = L/a = \frac{1}{2}$ resonant period wherein signal A is $1T$, signal B is $.35T$ which correlates to $2f$ and $2.86f$ [known to convert between period and frequency $f = 1/T$] therefore greater than natural frequency)

*regarding claim 2, multipulse waveform has two drive pulses (fig. 1; col. 7, lines 7-26)

*regarding claim 3, multipulse waveform has three drive pulses (fig. 2; col. 8, lines 23-44)

*regarding claim 4, multipulse waveform has four drive pulses (fig. 3; col. 8, lines 23-44)

*regarding claim 5, pulse frequencies are greater than about $1.3 f_j$ (fig 1; signal A is $1T$, signal B is $.35T$ which correlates to $2f$ and $2.86f$)

*regarding claim 6, pulse frequency is greater than about $1.5 f_j$ (fig 1; signal A is $1T$, signal B is $.35T$ which correlates to $2f$ and $2.86f$)

*regarding claim 7, pulse frequency is between about $1.5 f_j$ and about $2.5 f_j$ (fig 2; signal A is $1T$, signal B is $.4T$, signal C is $.4T$ which correlates to $2f$ and $2.5f$)

Art Unit: 2853

*regarding claim 8, pulse frequency is between about $1.8 f_j$ and about $2.2 f_j$ (fig 2; signal A is $1T$, signal B is $.4T$, signal C is $.4T$ which correlates to $2f$ and $2.5f$ [2.5 is about 2.2 – about does not provide for how much difference is acceptable around 2.5])

*regarding claim 9, two or more pulses have the same pulse period (fig. 5; col. 8, line 67 – col. 9, line 28; pulses are variable and thus can be selected to have same pulse)

*regarding claim 10, individual pulses have different pulse periods (fig. 5; col. 8, line 67 – col. 9, line 28; pulses are variable and thus can be selected to have same pulse)

*regarding claim 12, two or more pulses comprise one or more unipolar pulses (fig. 1,2,3)

*regarding claim 13, droplet ejection device comprises a pumping chamber and the actuator is configured to vary the pressure of the fluid in the pumping chamber in response to the drive pulses (col. 1, line 60- col. 2, line 9; fig. 8A,8B,9)

*regarding claim 14, each pulse has an amplitude corresponding to a maximum or minimum voltage applied to the actuator, and wherein the amplitude of at least two of the pulses are substantially the same (fig. 1, 2, 3, 4)

Art Unit: 2853

*regarding claims 17 & 33, droplet ejection device is an ink jet (col. 6, lines 58-63; col. 1, lines 34-45)

*regarding claim 34, ink jet printhead comprising the ink jet of claim 30

5. Claims 18-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Korol (US 2001/0022596)

Korol discloses the following claim limitations:

*regarding claims 18 & 21, method comprising driving a piezoelectric droplet ejection device/ink jet, 10/ (fig. 1; ¶0033) with a waveform (fig. 2a,2b) comprising:

*one or more pulses each having a period less than about 20 microseconds to cause the droplet ejection device to eject a single droplet in response to the pulses (fig. 2a; ¶0036, 0038, 0039, 0040 – in particular contains a pulse component/116/ with period of 9µs [one or more])

*regarding claim 19, one or more pulses each have a period less than about 12 microseconds (fig. 2; ¶0038 - pulse component/116/ 9µs)

*regarding claim 20, one or more pulses each have a period less than about 10 microseconds (fig. 2; ¶0038 - pulse component/116/ 9µs)

*further regarding claim 21, two or more pulses (fig. 2; ¶0038, 0039; pulse component/130/ with period of 7µs & pulse component/124/ with period of 4µs)

Art Unit: 2853

*regarding claim 22, two or more pulses each have pulse period less than about 12 microseconds (fig. 2; ¶0038, 0039; pulse component/ 130/ with period of 7 μ s & pulse component/124/ with period of 4 μ s)

*regarding claim 23, two or more pulses each have pulse period less than about 8 microseconds (fig. 2; ¶0038, 0039; pulse component/ 130/ with period of 7 μ s & pulse component/124/ with period of 4 μ s)

*regarding claim 24, two or more pulses each have pulse period less than about 5 microseconds (fig. 2; ¶0038, 0039; pulse component/ 130/ with period of 7 μ s & pulse component/124/ with period of 4 μ s - about does not provide for how much difference is acceptable around 5microseconds)

*regarding claim 25, droplet has a mass between about 1 picoliter and 100 picoliters (¶0040 – volume of 58 pl)

*regarding claim 26, droplet has a mass between about 5 picoliters and 200 picoliters (¶0040 – volume of 58 pl)

*regarding claim 27, droplet has a mass between about 50 picoliters and 1000 picoliters (¶0040 – volume of 58 pl)

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 11 & 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (US 6,099,103) in view of Korol (US 2001/0022596).

Takahashi discloses all the claim limitations except for the following:

*regarding claim 11, two or more pulses comprise one or more bipolar pulses

*regarding claim 15, each pulse has an amplitude corresponding to a maximum or minimum voltage applied to the actuator, and wherein the amplitude of at least two of the pulses are different

Korol teaches the following:

*regarding claim 11, two or more pulses comprise one or more bipolar pulses (fig. 1; ¶0038) for the purpose of concentrating energy at frequencies near the natural frequency of a desired mode

*regarding claim 15, each pulse has an amplitude corresponding to a maximum or minimum voltage applied to the actuator, and wherein the amplitude of at least two of the pulses

Art Unit: 2853

are different (fig. 1; ¶0038,0039) for the purpose of concentrating energy at frequencies near the natural frequency of a desired mode

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize two or more pulses comprise one or more bipolar pulses; and each pulse has an amplitude corresponding to a maximum or minimum voltage applied to the actuator, and wherein the amplitude of at least two of the pulses are different as taught by Korol into Takahashi for the purpose of concentrating energy at frequencies near the natural frequency of a desired mode

Response to Arguments

8. Applicant's arguments, see page 7 [top of page] regarding claims 1 & 28; page 8 regarding claims 18 & 21, filed 19 January 2007, with respect to the rejection(s) of claim(s) 1, 18, 21 & 28 under 102(b) and 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Korol (US 2001/0022596) and Takahashi (US 6,099,103).

Allowable Subject Matter

9. Claims 16, 29-31 & 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: The primary reason for the allowance of claim 16 is the inclusion of the method steps of an ink jet recording device that includes amplitude of each subsequent pulse in the two or more pulses is greater than the amplitude of earlier pulses. It is these steps found in each of the claims, as

Art Unit: 2853

they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 29-31 and 34 is the inclusion of the limitations being for a droplet ejection device wherein harmonic content of the plurality of drive pulses at f_j is less than about 50% of the harmonic content of the plurality of the drive pulses at f_{\max} , the frequency of maximum content. It is these limitations found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

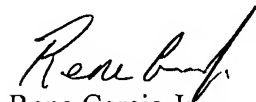
Art Unit: 2853


Communication with the USPTO

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Garcia, Jr. whose telephone number is (571) 272-5980. The examiner can normally be reached on M-F 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Rene Garcia Jr
02/07


STEPHEN MEIER
SUPERVISORY PATENT EXAMINER